

In re Patent Application of:
ENRIQUEZ ET AL
Serial No. 10/090,291
Filed: MARCH 4, 2002

In the Claims:

Claims 1-20 (cancelled).

21. (previously presented) For use with a subscriber line interface circuit (SLIC) having tip and ring amplifiers, each of said tip and ring amplifiers having a first polarity input and a second polarity input, said first polarity input being coupled to a voltage-dividing node of a voltage divider, said voltage divider having an input terminal to which a DC input voltage is applied, and a grounded reference terminal, said second polarity input of said tip amplifier being coupled to receive a first current that is produced by a first current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said tip amplifier, and said second polarity input of said ring amplifier being coupled to receive a second current that is produced by a second current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said ring amplifier, the improvement comprising:

a voltage regulator, referenced to ground and coupled to said voltage divider, and being operative, for a first value of DC voltage relative to ground, that is generated at said voltage-dividing node of said voltage divider as a result of said current flowing through said voltage divider in response to application of said DC input voltage to said input terminal thereof, said first value of DC voltage being less than a prescribed value of regulated DC voltage V_{reg} relative to ground, to cause said first value of DC voltage to be provided by said voltage-dividing node of said voltage divider, and applied thereby to said first polarity inputs of said tip and ring amplifiers and, for a second

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value of DC voltage relative to ground, that is generated at said voltage-dividing node of said voltage divider as a result of said current flowing through said voltage divider in response to application of said DC input voltage to said input terminal thereof, said second value of DC voltage being at or above said prescribed value of regulated DC voltage Vreg, to limit the value of DC voltage provided by said voltage-dividing node of said voltage divider, and applied thereby to said first polarity inputs of said tip and ring amplifiers, to said prescribed value of regulated DC voltage Vreg relative to ground, so that each of said first and second currents is limited in accordance with said regulated DC voltage Vreg relative to ground, irrespective of said DC input voltage exceeding said prescribed value of regulated DC voltage Vreg relative to ground.

22. (previously presented) The improvement according to claim 21, further including first and second low pass filters respectively coupled with said first and second current sources, and being operative to pass DC supply energy and prevent noise from being introduced into voice paths of said tip and ring amplifiers.

23. (cancelled)

24. (previously presented) The improvement according to claim 21, wherein said voltage regulator is coupled directly to said first voltage-dividing node of said voltage divider, so as to directly regulate the voltage at said first voltage-dividing node of said voltage divider to said prescribed value of regulated DC voltage Vreg relative to ground.

25. - 32. (cancelled)

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33. (new) For use with a subscriber line interface circuit (SLIC) having tip and ring amplifiers, each of said tip and ring amplifiers having a first polarity input and a second polarity input, said first polarity input being coupled to a voltage-dividing node of a voltage divider, said voltage divider having an input terminal to which a DC input voltage is applied, and a grounded reference terminal, said second polarity input of said tip amplifier being coupled to receive a first current that is produced by a first current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said tip amplifier, and said second polarity input of said ring amplifier being coupled to receive a second current that is produced by a second current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said ring amplifier, the improvement comprising:

a voltage regulator, referenced to ground and having an input thereof coupled to receive a DC voltage, and an output thereof coupled to said input terminal of said voltage divider, and being operative, for a first value of said DC voltage relative to ground being less than a prescribed value of regulated DC voltage V_{reg} relative to ground, to cause said first value of DC voltage to be replicated at said input terminal of said voltage divider, whereby a fraction of said first value of said DC voltage is provided by said voltage-dividing node of said voltage divider, and applied thereby to said first polarity inputs of said tip and ring amplifiers and, for a second value of said DC voltage relative to ground being at or above said prescribed value of regulated DC voltage V_{reg} , to limit the value of DC voltage at said input terminal of said voltage divider to said prescribed value of

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regulated DC voltage Vreg relative to ground, whereby a fraction of said prescribed value regulated DC voltage Vreg relative to ground is provided by said voltage-dividing node of said voltage divider, and applied thereby to said first polarity inputs of said tip and ring amplifiers, so that each of said first and second currents is limited in accordance with said regulated DC voltage Vreg relative to ground, irrespective of said DC input voltage exceeding said prescribed value of regulated DC voltage Vreg relative to ground.

34. (new) The improvement according to claim 33, further including first and second low pass filters respectively coupled with said first and second current sources, and being operative to pass DC supply energy and prevent noise from being introduced into voice paths of said tip and ring amplifiers.

35. (new) A method for limiting the value of DC voltage applied to tip and ring amplifiers of a subscriber line interface circuit (SLIC) having tip and ring amplifiers, each of said tip and ring amplifiers having a first polarity input and a second polarity input, said first polarity input being coupled to a voltage-dividing node of a voltage divider, said voltage divider having an input terminal to which a DC input voltage is applied, and a grounded reference terminal, said second polarity input of said tip amplifier being coupled to receive a first current that is produced by a first current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said tip amplifier, and said second polarity input of said ring amplifier being coupled to receive a second current that is produced by a second current source in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input

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terminal thereof, and independent of the output of said ring amplifier, said method comprising the steps of:

(a) in response to said DC input voltage having a DC voltage value relative to ground that is less than a prescribed value of regulated DC voltage Vreg relative to ground, causing said DC input voltage to be replicated at said input terminal of said voltage divider, whereby a fraction of said DC input voltage is provided at said voltage-dividing node of said voltage divider, in response to said current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and applied thereby to said first polarity inputs of said tip and ring amplifiers; and

(b) in response to said DC input voltage having a DC voltage value relative to ground that is at or above said prescribed value of regulated DC voltage Vreg relative to ground, limiting the DC voltage at said input terminal of said voltage divider to said prescribed value of regulated DC voltage Vreg relative to ground, whereby a fraction of said prescribed value of regulated DC voltage Vreg relative to ground is provided at said voltage-dividing node of said voltage divider, in response to said current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and applied thereby to said first polarity inputs of said tip and ring amplifiers, whereby the magnitude of each of said first and second currents is limited in accordance with said regulated DC voltage Vreg relative to ground, irrespective of said DC input voltage exceeding said prescribed value of regulated DC voltage Vreg relative to ground.

36. (new) The method according to claim 35, further including the step (c) of coupling first and second low pass filters to said first and second current sources, respectively, said first and second low pass filters being operative to pass DC

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supply energy therethrough, and to prevent noise from being introduced into voice paths of said tip and ring amplifiers.

37. (new) A circuit arrangement for applying a DC voltage to tip and ring amplifiers of a subscriber line interface circuit (SLIC) comprising:

a voltage divider having an input terminal to which a DC input voltage is applied, a grounded reference terminal, and a voltage-dividing node coupled to a first polarity input of each of said tip and ring amplifiers;

a first current source that is operative to supply a first current to a second polarity input of said tip amplifier, in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said tip amplifier;

a second current source that is operative to supply a second current to a second polarity input of said ring amplifier, in accordance with current flowing through said voltage divider as a result of application of said DC input voltage to said input terminal thereof, and independent of the output of said tip amplifier; and

a voltage regulator, referenced to ground and having an input terminal thereof coupled to receive a DC voltage, and an output thereof coupled to said input terminal of said voltage divider, and being operative to regulate a DC voltage relative to ground that is applied to said input terminal of said voltage divider, such that, for said DC voltage having a DC voltage value relative to ground that is less than a prescribed value of regulated DC voltage V_{reg} relative to ground, said DC voltage regulator replicates said DC voltage at said input terminal of said voltage divider, whereby a fraction of said DC voltage is generated at said voltage-dividing node of said voltage divider, and applied

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thereby to said first polarity inputs of said tip and ring amplifiers, and such that, for said DC voltage having a DC voltage value relative to ground that is at or above said prescribed value of regulated DC voltage Vreg relative to ground, said DC voltage regulator limits the DC voltage at said input terminal of said voltage divider to said prescribed value of regulated DC voltage Vreg relative to ground, whereby a fraction of said prescribed value of regulated DC voltage Vreg relative to ground is generated at said voltage-dividing node of said voltage divider, and applied thereby to said first polarity inputs of said tip and ring amplifiers, so that the magnitude of each of said first and second currents is limited in accordance with said regulated DC voltage Vreg relative to ground, irrespective of said DC input voltage exceeding said prescribed value of regulated DC voltage Vreg relative to ground.

38. (new) The circuit arrangement according to claim 37, further including first and second low pass filters respectively coupled with said first and second current sources, and being operative to pass DC supply energy and prevent noise from being introduced into voice paths of said tip and ring amplifiers.